face-mould, which is not elliptical, and cannot therefore be formed directly from the plan, will now be explained. It may be observed, that the sides of the solid H G K J, fig. 2, unlike the sides of the solid in fig. 1, do not lie vertically over the plan A B C D, but merely contain the solid, from which the wreath can be formed. The face-mould of this solid may be constructed as follows:—Referring to a former diagram, let the triangle A K C be represented by the triangle A E F of the annexed figure,

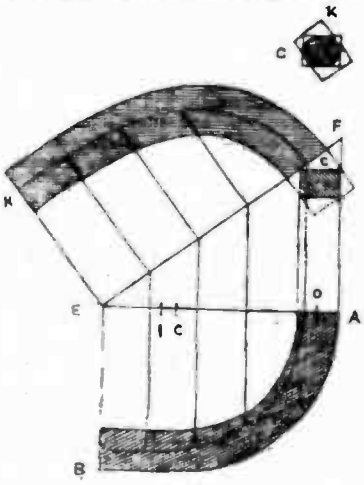

Fig. 3.

the line E F, representing the inclination of the plank, and let A B represent the plan of a wreath, the circular parts of which are described from the centre C. Upon the line A F draw a rectangular section of the square wreath, as is shown by the shaded part G. Draw the dotted rectangle G, containing the shaded section; this rectangle will be of the same size as the transverse section of a rectangular solid that will contain the square wreath. From the middle of that side of the dotted rectangle that lies in the line E F let fall a perpendicular line upon A E, and from D, the middle point of the breadth of the plan, extend the compasses to the centre C. Remove the compasses along the line A E until the point that was at D reaches the point of intersection of A E by the dotted line let fall from E F, and cross the line A E at I. Then, with I as a centre, and the compasses extended as above, describe an arc upon the plan A B, from this arc trace the curve H G; this curve is the middle line of the orthogonal face-mould. Set off half the breadth of the dotted rectangle G from each side of this curve. The figure H F, thus constructed, is the orthogonal face-mould of a wreath, the section of which is G and the plan A B. The solid cut out by this face-mould is similar to that exhibited in diagram 2, and is sufficiently large to admit of the wreath being perfectly squared within it."

The construction of the butt-joint lines of the hand-rail upon strict geometrical principles, and the determination of the scrull from the logarithmical spiral, are amongst the other points in the work deserving of consideration.

NOTES IN THE PROVINCES.

The church of Great Milton has been re-opened, after having been restored under the direction of Mr. Scott. Nearly the whole of the chancel has been taken down and rebuilt, the roof rebeamed, and new stonework erected on the tower-turret. The old pews have been replaced by low open seats. In the chancel are now seen the sedilia, piscina, and a small earthenware oven, built in the north wall, and supposed to have been used in baking the eucharist wafer. Mr. G. Wyatt, of Oxford, builder, carried out the restorations.——A subterranean passage has been discovered at Colchester Castle. It has been explored only to a certain extent, and has been found to run throughout the whole length of the castle, with a width of about 20 feet. Some old Roman remains have also been discovered at the castle.——The consumption of gas is on the increase at Chelmsford, where a new gashouse has been erected, 64 feet long by 44 feet wide, and 30 feet to the roof, which is of wrought-iron. The house contains space for forty retorts, five of which are now in constant and five in occasional operation. The old gashouse adjacent is to be converted into a coal depot.——The Ipswich Gas Company has announced a reduction from 6s. to 5s. a thousand feet.——The keystone of the new bridge at March was laid on Wednesday in last week.——The old Town-hall of Leighton Buzzard has been removed, and the first stone of a new one was laid on the same site on Monday in the week before last. It will be a brick structure, 68 feet long by 20 feet 8 inches wide. The ground-floor will be arranged for stalls, over which there will be a room the entire length of the building, 18 feet between the floor and ceiling, and fitted up for public meetings, with a moveable partition for one of smaller dimensions for manor courts and other purposes. The expense will be borne by Lord Leigh, the lord of the manor.——St. Thomas's Church, Portsmouth, has been decorated and fitted up with gas.——The old church at Cowes has been repaired, altered, and redecorated under the joint superintendence of Mr. G. Marvin and Mr. G. Wheeler.——A bronze figure of the late Sir C. Morgan has just been erected in the small square in front of the Tredegar Estate Offices, Newport, Wales. The design was furnished by Mr. Evan Thomas. The figure is placed on a pedestal of Aberdeen granite, which bears suitable inscriptions in English and Welsh.——A scheme is said to be in progress to raise a fund for ten new churches and school-houses in the mining districts of Merthyr and South Wales.——On Monday week a new Catholic cemetery was consecrated at Birmingham. The ground is in the suburbs, and is to be ornamentally laid out. A parish church is to be here erected in the Gothic style. The chancel and Lady Chapel are already built, and will be used for the present by the officiating priest until the building is completed. The entire cost will be about 7000*l.*——A public building is to be erected in Broad-street, Birmingham, for exhibitions, equestrian performances, and other purposes of a similar nature. The building will also be available for the annual cattle show. Messrs. Branson and Gwyther are the contractors, and a plan has been prepared by them and approved by Mr. Hemming, the architect, on the part of the promoters. Considerable progress has already been made; and the contractors have undertaken to complete the building in time for the approaching cattle show.——The foundation stone of a building to be called the Church of the Holy Apostles, now in course of erection in upper Victoria-street, Sheffield, was laid on Tuesday week. It will be a Gothic building with a tower and spire. Mr. Stephenson, of London, is the architect. The church is intended to be opened next Easter.——On Saturday last great part of a grinding mill at Sheffield fell while the hands were at work. The building was three stories high, and the part which fell consists of three rooms, measuring about 50 feet by 24. Several men were involved in the ruins, but none of them were killed on the spot. Nothing is said as to the cause.——Since the reduction of the price of gas at Rochdale, from 7s. in 1848, to 6s. in 1849, and 5s. in 1850, the concern has not only become "a profitable undertaking," but "a huge new gasometer tank," has just been completed, with the view of enabling the gas committee to meet the increasing demand.——The Newcastle baths and washhouses are, it seems, in so prosperous a state, that the committee propose to erect a second establishment.——A large building for a Surgical Hospital, in addition to the Infirmary, is to be erected at Edinburgh, on a site between the old High School and the Infirmary.——The authorities of Edinburgh have purchased an extensive area at Lochrin as the site of intended abattoirs. The buildings are to have an ornamental character, and will be in the form of an oblong square. The inclosure will probably extend 450 feet in length by 350 in breadth—the entrance being by two gates, having an elevated lodge between them. Each end of the quadrangle is to have a double range of booths, with a paved passage between them. The walls of the booths are about 22 feet in height, exclusive of the projecting roof, which has an entire range of ventilators. Each booth has behind it a back house, 10 feet high, for securing the cattle, with a small enclosed court attached, by which the cattle will enter the building. The centre of the quadrangle is to be used as the hide and skin market. Pigs are to have an exclusive slaughterhouse; and an abundant supply of water is to be introduced into each booth. Mr. Cousin, Superintendent of Public Works, has furnished the designs.——The Scottish Episcopalians have erected a new church at Dunoon, which has been consecrated by the Bishop of Argyle.

PASSAGE OF WATER THROUGH PIPES.

In a late number of your publication (page 441), a correspondent "Baylis," directs attention to a discrepancy he imagines he has discovered between the result of experiments on the flow of water through pipes, made under the direction of the Metropolitan Commissioners of Sewers, and the results arrived at by the formulæ of Beardmore and Hawksley, the former exhibiting a discharge of 75 cubic feet per minute, from a pipe of 6 inches diameter, at an inclination of 1 in 60, while Beardmore's tables exhibit but 53, and Hawksley's formula 52.

"Baylis" suggests that the officers of the Sewers Commission experimented with *pure* water; the other gentlemen named, with sewage.

I trust I shall not be deemed impertinent in coming forward to correct this suggestion of "Baylis," by offering for his consideration the real merits of the subject, and I shall be disappointed if, after a little more investigation, he do not agree with me in thinking that the experiments of the Sewers Commission are very satisfactory, as far as this particular size of pipe at the stated inclination is concerned.

The formulæ of Beardmore and Hawksley—indeed, of Eytelwein, Prony, Young, Smeaton, and other authorities—are all constructed upon the basis of experiments made with heads of water at the ends of pipes; so that the water being only admitted at the end of the pipe, is exposed to friction throughout the whole length; and such formulæ are strictly applicable to "water works," and the distribution of water through mains. On the contrary, the experiments of the officers of the Sewage Commission, being for the purposes of "drainage," were made through pipes *having junctions attached at intervals, by which the water was admitted as well as at the head*; and it is expressly recorded as one of the results of the experiments, that it was found necessary, in a line of pipes 100 feet long, laid at an inclination of 1 in 60, to apply an *additional* head of 22 inches to obtain the same result without the junctions, as that accruing with their aid. It was also discovered that the discharges were about as the square roots of the inclinations.

Let us now compare the experiments with Mr. Beardmore's tables (I have not Mr. Hawksley's formula at hand, although I think it gives rather less results than Mr. Beardmore):—

In a length of 100 feet, to get an inclination of 1 in 60, we must have about . .	18 inches head.
To which we must add, to place the experiments on a par with the formula . .	22 " "
Giving, without the aid of junctions, a total head of .	40 inches,

which is equal to an inclination of about 1 in 30; which, by Beardmore's tables, would yield a discharge of 76 cubic feet per minute: by the experiments of the Sewers Commission, it was 75 cubic feet per minute.

Again, let us, by the formula of the Sewers Commission, reduce the amount of discharge to what it would have been without the aid of junctions, or the compensating additional head of 22 inches; in other words, adjust it to the tables:—

$\sqrt{30} : 75 :: \sqrt{60} : 53$ cubic feet per minute, which exactly corresponds with Mr. Beardmore. Edward Ryde.

The following table of the capacity and power of culverts and pipes for discharging fluids is compiled from a lengthened series of observations; but I regret to have to say that

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